R17a **Spatially resolved physical conditions of molecular gas and potential star formation tracers in M83, revealed by the Herschel SPIRE FTS**

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Since the launch of the Herschel Space Observatory, our understanding about the photo-dissociation regions (PDR) has taken a step forward. In the bandwidth of the Fourier Transform Spectrometer (FTS) of the Spectral and Photometric Imaging REceiver (SPIRE) on board Herschel, ten CO rotational transitions, including J=4-3 to J=13-12, and three fine structure lines, including [CI] 609, [CI] 370, and [NII] 250 micron, are covered. In this talk, I present our findings from the FTS observations at the nuclear region of M83, based on the spatially resolved physical parameters derived from the CO spectral line energy distribution (SLED) map and the comparisons with the dust properties and star-formation tracers. I will discuss (1) the potential of using [NII] 250 and [CI] 370 micron as star-formation tracers; (2) the reliability of tracing molecular gas with CO; (3) the excitation mechanisms of warm CO; (4) the possibility of studying stellar feedback by tracing the thermal pressure of molecular gas in the nuclear region of M83.